Claims 1-10 are pending.

A Drawing Change Authorization Request is submitted correcting Fig. 2 by drawing the lead line 11.

Claims 6-8 and 10 are objected to. The monochromator of claim 6 has only one concave mirror and one slit. The Specification has been amended at page 9, lines 23-26 to clarify this.

Claims 1-10 are rejected over Minami, JP-08292096 in view of Rogers, U.S. 6,118,583.

Minami discloses a spectroscope having an inlet slit 3, a collimator mirror 4, a diffraction grating 5, a camera mirror 6, and an outlet slit 7 on the diffraction grating 5 via the collimator mirror 4. Light dispersed by this diffraction grating 5 images on the outlet slit 7 with the camera mirror 6, and the intensity of the light imaged on this outlet slit 7 is detected through a photo detector 9. The collimator mirror 4 is made so as to be rectilinearly shiftable along an optical path L.

Minami does not disclose a monocromator in which the coefficient of linear expansion of a focal length of the one or more concave mirrors and a coefficient of linear expansion of a substrate to which the mirrors are affixed are approximately the same. Therefore, the present invention differs from the invention of Minami.

Rogers is relied on for a teaching that recognizes thermal expansion problems. Rogers is directed to a two stage optical imaging system that operates in the infrared range. The patent broadly teaches that the optical components are several mirrors that may be made from a material, such as aluminum, which is the same as or which has

the same coefficient of thermal expansion as that forming the housing and support structure for the system. This is to make the system be inherently athermalized (see column 2, lines 3-11). That is, in order to prevent the system response from changing due to thermal changes, the same material (which inherently has the same coefficient of thermal expansion) is used for both the mirrors and the housing.

Rogers is not directed to a monochromator and the components of his system are not the same. For example, Rogers does not have a diffraction grating.

In the monochromator of the present invention, making the coefficient of thermal expansion of mirrors and support structure to be the same is not necessarily sufficient to prevent the monochromator performance from changing due to temperature changes.

For example, if the coefficient of linear expansion of diffraction grating 4 shown in Fig. 1 of the present invention is large, the widths of the numerous grooves in the diffraction grating 4 vary greatly depending on the temperature. Accordingly, the wavelength of the light passing through output slit 7 will vary depending on the temperature. This problem is not overcome even if the coefficient of linear expansion of diffraction grating 4 and the coefficient of linear expansion of substrate 22 of the monocromator of the invention are the same. To solve the problem, irrespective of the coefficient of linear expansion of substrate 22 (Fig. 1), the coefficient of linear expansion of diffraction grating 4 must be controlled to be as small as possible. Rogers does not recognize this since he does not have a diffraction grating. When a plane mirror is used in the monochromator, even if a coefficient of linear expansion of the plane mirror is

changed, the resolution response of the monochromator is hardly changed by temperature changes.

In the monochromator of the present invention, an appropriate coefficient of linear expansion of each optical component varies according to characteristics of each component. Therefore, it cannot be easily anticipated how to prevent resolution change due to changes in ambient temperature in the monochromator only from the descriptions disclosed in Rogers' two stage imaging system.

Furthermore, Rogers discloses that mirrors are made from a material such as aluminum. However, in the highly accurate monochromator of the present invention, concave mirrors made from aluminum cannot be adopted because of accuracy demands, and concave mirrors made of glass are generally used. Even if concave mirrors made of glass are used in Rogers, it is not possible to anticipate the kind of material to be used for the substrate in order to have the same coefficient of linear expansion as that of the glass. Furthermore, since it is difficult to modify a composite of aluminum and ceramic, generally, composites are not used in optical devices.

Therefore, the present invention differs from Rogers, and the present invention would not have been obvious to one having ordinary skill in the art at the time the invention was made.
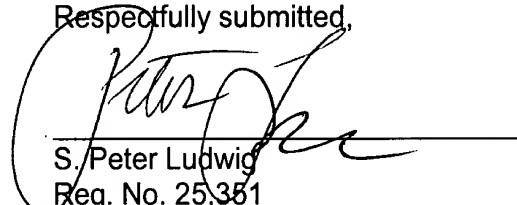
In view of the above amendments and remarks, it is respectfully requested that the application be reconsidered and that all pending claims be allowed and the case passed to issue.

If there are any other issues remaining which the Examiner believes could

be resolved through either a Supplemental Response or an Examiner's Amendment, the

Examiner is respectfully requested to contact the undersigned at the telephone number

indicated below.

Prompt and favorable action is requested.

Respectfully submitted,

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MARK-UP OF SPECIFICATION FOR
AMENDMENT PURSUANT TO 37 C.F.R. §1.121

<u>Page 9, Lines 23-26</u>

Moreover, <u>in a second embodiment,</u> a single concave mirror may be used

instead of the concave mirrors 20 and 21. The single concave mirror condenses optical

rays from the light source and outputs to the diffraction grating, and further inputs the

optical rays from the diffraction grating and outputs the optical rays to the output slit

plage. <u>Here, the input slit and the output slit are the same.</u>

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PENDING CLAIMS IN APPLICATION

1.   A monochromator comprising:

an optical ray input section which limits the width of optical rays input from a

light source,

a first concave mirror for converting the optical rays passing through the optical

ray input section into parallel rays,

a diffraction grating for separating the parallel rays by wavelength into diffracted

rays,

a second concave mirror for condensing the diffracted rays when the diffracted

rays are input,

an optical ray output section which limits a wavelength band width of the

condensed rays, and

a substrate to which the optical ray input section, the first concave mirror, the

diffraction grating, the second concave mirror, and the optical ray output section are fixed;

wherein a coefficient of linear expansion of a focal length of the first concave

mirror, a coefficient of linear expansion of a focal length of the second concave mirror, and a

coefficient of linear expansion of a material forming the substrate are approximately the same.

2.   The monochromator according to claim 1, wherein, when a width of the

optical ray output section is d, a focal length of each of the first and second concave mirrors when assembling the monochromator is L, a difference between an ambient temperature when operating the monochromator and the temperature when assembling the monochromator is ΔT, and a numerical aperture of the concave mirror is a, the absolute value of difference between the coefficient of linear expansion of the material forming the substrate and the coefficients of linear expansion of the material of the first and second concave mirrors is the absolute value of $d/(4aL\Delta T)$ or less.

3.   The monochromator according to claim 1, wherein a difference between the coefficient of linear expansion of the material forming the substrate and the coefficients of linear expansion of the focal lengths of the first and second concave mirrors is $10 \times 10^{-6}/°C$ or less.

4.   The monochromator according to claim 1, wherein the material forming the substrate is a composite of aluminum and ceramic.

5.   The monochromator according to claim 1, wherein at least one of the optical ray input section and the optical ray output section is a slit.

6.   A monochromator comprising:

a slit to limit a width of optical rays input from a light source,

a concave mirror to convert the optical rays passing through the slit into parallel

rays,

a diffraction grating to separate the parallel rays into diffracted rays by wavelength, and

a substrate to which the slit, the concave mirror, and the diffraction grating are fixed;

wherein the concave mirror condenses the diffracted rays when the diffracted rays are input, and the slit limits a wavelength band width of the condensed rays;

wherein a coefficient of linear expansion of a focal length of the concave mirror and a coefficient of linear expansion of a material forming the substrate are approximately the same.

7.	The monochromator according to claim 6, wherein a difference between the coefficient of linear expansion of the material forming the substrate and the coefficient of linear expansion of the focal length of the first and second concave mirror is $10 \times 10^{-6}/°C$ or less.

8.	The monochromator according to claim 6, wherein the material forming the substrate is a composite of aluminum and ceramic.

9.	An optical spectrum analyzer comprising the monochromator according to claim 1.

10.	An optical spectrum analyzer comprising the monochromator according to

claim 6.

11.   The monochromator according to claim 1 wherein said diffraction grating has the smallest possible coefficient of linear expansion.